Mark Scheme (Results)

October 2023

Pearson Edexcel International Advanced Level In Biology (WBI15)
Paper 01 Unit 5: Respiration, Internal Environment, Coordination and Gene Technology

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Additional guidance	Mark
1(a)(i)	Choose an item. • C is the correct answer A is not the correct answer as acetylcholinesterase is not used in the production of recombinant DNA B is not the correct answer as amylase is not used in the production of recombinant DNA D is not the correct answer as RNA polymerase is not used in the production of recombinant DNA		(1)

Question number	Answer	Additional guidance	Mark
1(a)(ii)	Choose an item. • C is the correct answer A is not the correct answer as DNA is not just found in the nucleus B is not the correct answer as DNA is not just found in the plasmid D is not the correct answer as DNA is not found in the plasmid and nucleus		(1)

Question number	Answer	Additional guidance	Mark
1(a)(iii)	Choose an item. • D is the correct answer A is not the correct answer as adjacent nucleotides are not joined by hydrogen bonds B is not the correct answer as adjacent nucleotides are not joined by ionic bonds C A is not the correct answer as adjacent nucleotides are not joined by peptide bonds		(1)

Question number	Answer	Additional guidance	Mark
1(b)	A description that includes three of the following points: • transcription factors are proteins (1) • (TF / transcription initiation complex / proteins) bind to {sections of DNA / genes / promotor (region)} (1) • {catalysing / causing} {methylation / deacetylation / demethylation / dephosphorylation} of histone (proteins) (1) • preventing the binding of RNA polymerase (to the DNA) (1)	ignore bases / enhancer sequence accept {causing DNA to be wrapped more tightly / heterochromatin} ignore histone modification unqualified accept {stop / decrease} transcription accept makes the DNA inaccessible to RNA polymerase	(3)

Question number	Answer	Additional guidance	Mark
2(a)	A description that includes four of the following points: • pupil {contracts / constricts / gets smaller} in high light intensity / pupil {dilates / enlarges} in low light intensity (1) • involves circular and radial muscles which are antagonistic (1) • impulse transmitted along {motor neurone/ sympathetic nervous system/ parasympathetic nervous system/ nerve} (to muscle) (1) • (in bright light / high light intensity) circular muscle contract and radial muscle relax to make pupil {contract / constrict / get smaller} (1) • (in dim light / low light intensity) circular muscle relax and radial muscle contract to make pupil {dilate / enlarge} (1)	Can piece together mp1 accept pupil {contracts / constricts / gets smaller} to allow less light to enter / pupil {dilates / enlarges} to allow more light to enter accept pupil dilates in the dark ignore optic accept circular muscle contract and radial muscle relax in {bright light / high light intensity} accept circular muscle relax and radial muscle contract in {dim light / low light intensity}	(4)

Question number	Answer	Additional guidance	Mark
2(b)(i)	Choose an item. • C is the correct answer A is not the correct answer as auxin and retinol are not photosensitive pigments in the eye B is not the correct answer as lysozyme and ribose are not photosensitive pigments in the eye D is not the correct answer as phytochrome and opsin are not photosensitive pigments in the eye		(1)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	Choose an item. • B is the correct answer A is not the correct answer as lidocaine does not increase nerve transmission C is not the correct answer as lidocaine does not increase nerve transmission D is not the correct answer as lidocaine does not increase nerve transmission		(1)

Question number	Answer	Additional guidance	Mark
2(b)(iii)	A calculation showing the following steps: • calculation of {radius / diameter} of pupil in complete darkness (1) • calculation of the difference in diameter of pupil in sunlight and complete darkness (1)	 $\sqrt{(38.75 \div \pi)} = 3.51$ or $2 \times (\sqrt{(38.75 \div \pi)}) = 7.02$ $7.02 - 4 = 3.02$ mm accept answer in range 3.0 to 3.071mm accept 3 correct answer scores full marks	 (2)

candidates may use different π values

π values	radius	diameter
3.1	3.535533906 / 3.54	7.071067812 / 7.071
3.14	3.512942404 / 3.51	7.025884808 / 7.026
3.142	3.511824166 / 3.51	7.023648332 / 7.024
π	3.512051835 / 3.51	7.024103669 / 7.024

Question number	Answer	Additional guidance	Mark
3(a)(i)	A calculation showing the following steps: • calculation of radius of lesion A (1) • calculation of volume of A and answer given to **two** decimal places (1)	 A = (1.97 ÷ 2) = 0.985 / 0.99 / 0.98 answer to 2 dp between 3.94 and 4.06 correct answer for calculation using their pi value not to 2 dp = 1 mark 4.0 = 1 mark correct answer scores full marks	 (2)

These are the most common responses but please always use the mark scheme

1 mark	2 marks
0.985	answer to 2 dp between 3.94 and 4.06
0.99	
0.98	
answer between 3.940457173 to 4.06438 that is not given to 2 dp	

Question number	Answer	Additional guidance	Mark
3(a)(ii)	A calculation showing the following steps: • measurement of X - Y (1) • calculation of actual diameter given to two significant figures (1)	0.55cm (accept 0.53 – 0.60cm) (accept 5.3-6.0mm) Ignore units (5.5 ÷ 12 x 1.97) = 0.90 (cm) accept answer to 2 sig fig in range 0.87 to 0.99 If within range but not to 2 sig figs = 1 mark eg 0.985 (cm) correct answer scores full marks	(2)

These are the most common responses but please always use the mark scheme

1 mark	2 marks
0.53 to 0.6 (or 0.60)	2 sig fig in range 0.87 to 0.99
5.3 to 6.0 or (6)	
in range 0.87 to 0.99 not to 2 sig fig e.g. 0.985	

Question number	Answer	Additional guidance	Mark
3(b)	An answer that includes the following point: • to enhance the image (1)	to observe the tumour cells to identify where the tumour / tumour cells are to give a clearer image to make it easier to identify / find the tumour cells to see structure in brain to make structure visible to increase contrast / add colour (between tissues) accept lesions for tumour	(1)

Question number	Answer	Additional guidance	Mark
3(c)	An answer that includes two of the following points: • loss of myelin (in motor neurones) (1) • {damage to / lesions in} cerebellum (1) • (electrical) impulses are slowed down / {fewer / less} impulses reach (leg) muscles (1)	ignore signals accept {destruction of / damage to} myelin accept ADEM found in cerebellum accept reduced saltatory conduction accept fewer muscles are stimulated	(2)

Question number	Answer	Additional guidance	Mark
4(a)	An answer that includes two of the following points: • higher the mean resting heart rate the lower the mean life span (1) • correct conclusion for mean resting heart rate data (1) • correct conclusion for mean lifespan data (1)	accept converse accept negative correlation between resting heart rate and mean life span e.g. the mouse has the highest (mean resting) heart rate / the whale has the lowest (mean resting) heart rate e.g. humans have the longest life span / mouse has shortest lifespan / human life span is anomalous **Do not** accept conclusions based on size of animals (as no data) Accept as mean resting heart rate decreases life span increases except for humans = 2 marks	(2)

Question number	Answer	Additional guidance	Mark
4(b)(i)	Choose an item. B is the correct answer • A is not the correct answer as 6bpm is not the heart rate shown in the trace • C is not the correct answer as 60bpm is not the heart rate shown in the trace • D is not the correct answer as 75bpm is not the heart rate shown in the trace		(1)

Question number	Answer	Additional guidance	Mark
4(b)(ii)	An answer that includes two of the following points: • {Smaller / shorter} P wave in (trace) A (1) • R peak sharper in (trace) A (1) • shorter QRS wave duration in (trace) A (1) • T wave {larger / longer} in (trace) A (1)	accept converse unless refer to labels PQRST they will not get the marks accept one R peak in (trace) A and two R peaks in (trace) B accept QRS for R peak accept B (trace) has a larger hyperpolarisation / S is {larger / goes further down / wider} in B ignore T goes down in (trace) B accept the {trace / S-T} goes below the line in B (whereas A doesn't)	(2)

Question number	Answer	Additional guidance	Mark
4(c)(i)	An answer that includes two of the following points: • (improved) {health care / vaccines / antibiotics / medication / diet} (1) • skills and knowledge in disease control (1) • failure in cardiovascular system may not be fatal as it is for most mammals (1)	ignore ref to {myogenic / live in better habitat / intelligence} accept medication to control defects accept can adjust lifestyle to reduce risk of disease what the person can do for themself accept technology e.g. surgery / stent for CVD accept transplants what others need to do to them accept ref to any named organ / system accept no death due to predators ignore no predators humans don't have to run to catch their own food (or another reason linked to HR staying lower {so don't use up the number of beats too quickly / less damage to cardiac muscle})	(2)

Question number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that includes one of the following points: • cardiac output = heart rate x stroke volume (1) • cardiac output gives an indication of the efficiency of the heart / it is a measure of the rate at which blood is pumped {through heart / around body} (1)	accept cardiac output also includes stroke volume accept different animals may have different sized {hearts / ventricles} accept volume of blood pumped {per minute / per unit time} accept volume of blood per beat	(1)

Question number	Answer	Additional guidance	Mark
4(c)(iii)	A description that includes four of the following points: • cardiac output increases (1) • (because increased respiration leads to) {increased carbon dioxide / decrease in pH} (in the blood) which is detected by chemoreceptors (1) • (which) send impulse(s) to {cardiac control centre / medulla (oblongata)} (1) • (increased) impulses through {sympathetic nervous system / neurones} (1) • (increased) impulses to SAN which {depolarises more frequently / increases heart rate} (1) • (impulses to SAN which) increases force of contraction **of cardiac** muscle / causes **cardiac** muscles to contract harder (1)	ignore signals accept adrenaline released from adrenal gland accept baroreceptors detecting increase in blood pressure accept (adrenaline) travels in the blood accept (adrenaline) binds to SAN which depolarises more frequently	(4)

Question number	Answer	Additional guidance	Mark
5(a)	A description that includes four of the following points: • (action potential / impulse) causes {calcium ion channels to open / calcium ions to enter (presynaptic neurone)} (1) • (calcium ions cause) vesicles (containing neurotransmitter) to {fuse / bind} with **presynaptic membrane** (1) • which releases neurotransmitter (into the synaptic cleft) / neurotransmitter diffuses across synapse (1) • neurotransmitter binds with receptor (on post synaptic membrane) (1) • which initiates opening of sodium ion channels (resulting in an impulse in adjacent neurone) (1)	accept Ca^{2+}(voltage) gates open accept neurotransmitter released by exocytosis ignore cation channels accept Na^{+} (voltage) gates open	(4)

Question number	Answer	Additional guidance	Mark
5(b)	A description that includes four of the following points: • {isolate / identify} gene(s) for {enzymes / A and B} (from Madagascar periwinkle) (1) • cut plasmid with same {endonuclease / restriction enzyme} (1) • (genes are) {inserted into / attached to} plasmid (1) • sticky ends are joined using ligase (enzyme) (1) • (plasmid) which is taken up by the {*E. coli* / bacterium} (1) • *E. coli* {grown in (bio)fermenter / cultured} (1)	accept {isolate / cut (out)} {gene(s) / A and B} using restriction enzyme ignore {base sequence / DNA} unqualified ignore vector ignore vector accept join A and B and plasmid using ligase accept vector taken up by {*E. coli* / bacterium} accept bacteria given heat shock ignore gene gun	(4)

Question number	Answer	Additional guidance	Mark
5(c)	An answer that includes four of the following points: • serotonin concentration increases (over the 50 hours / time) (1) • tryptophan concentration decreased (over the 50 hours / time) (1) • (because) tryptophan {converted to serotonin / is the (first) substrate} (1) • by the enzymes produced from the genes that have been inserted into the E coli (1) • conversion slows (after 30 hours) due to {fewer enzyme-substrate complexes / suitable stated limiting factor} (1)	accept there is no serotonin at the start accept by enzymes A and B suitable stated limiting factor e.g. substrate concentration / enzyme concentration / product inhibiting the enzyme etc ignore comments regarding error bars As tryptophan concentration decreases the serotonin concentration increases = 2 marks	(4)

Question number	Answer	Additional guidance	Mark
6(a)(i)	Choose an item. • C is the correct answer A is not the correct answer as adrenaline does not decrease the breathing rate. B is not the correct answer as adrenaline does not decrease the heart rate. D is not the correct answer as adrenaline does not decrease the breathing rate or heart rate.		(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	An answer that includes three of the following points: • (mean) heart rate decreases as nicotine concentration increases (with or without adrenaline) (1) • (mean) heart rate increases as adrenaline concentration increases (1) • highest (mean) heart rate is with {highest / 0.1mmol dm^3) adrenaline concentration and {lowest / 0.001mmol dm^3 } nicotine concentration (1) • lowest (mean) heart rate is with {0.001mmol dm^3 adrenaline concentration and {highest / 1000 mmol dm^3 } nicotine concentration (1) • highest adrenaline concentration and no nicotine caused death of Daphnia (1)	Accept converse accept nicotine is a depressant accept adrenaline is a stimulant accept {0.00 / control / nil} for lowest nicotine concentration	(3)

Question number	Answer	Additional guidance	Mark
6(b)	Choose an item. • C is the correct answer A is not the correct answer as a gibberellin is not an enzyme that converts starch to glucose B is not the correct answer as a gibberellin is not a molecule that converts Pfr to Pr D is not the correct answer as a gibberellin is not a protein that wraps around DNA		(1)

Question Number	Answer
*6(c)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material indicated as relevant. Additional content included in the response must be scientific and relevant. accept R for red light and FR for far red light **FROM SECTIONS 1 T0 3 MAX 1 credit FROM EACH** **comment on short day (long night) plants (from the diagram)** • short day plants generally require {light period of less than 12 hours / dark period 8-10 hours / longer than critical night length} for flowering • description of light flashes and subsequent flowering or non flowering • interruption of critical night length by {1×R / 2×R and 1×FR} light periods prevents flowering • interruption of critical night length by {1×R and 1×FR / 2×R and 2×FR} light periods gives flowering • there is no flowering if last light flash is R during dark period / the plant flowers if last flash of light is FR • • **comment on long day (short night) plants (from the diagram)** • long day plants require light periods {of 14-16 hours / longer light periods / shorter dark periods / shorter than critical night length} for flowering • critical night length (with no light flashes) prevents flowering • (long day) plants flower {with any (brief) R in long dark night / if last flash of light is R} / interruption of critical night length by {one R (660nm) / two R and one FR} light periods allows flowering • interruption of critical night length by {1×R + 1×FR / 2×R and 2×FR} light periods prevents flowering • **comment on gibberellin graph** • number of flowers affected by gibberellin concentration / the number of flowers increase and then decreases as gibberellin increases • {intermediate concentration / 1.5 µm} gave greatest number of invitro flowers • highest concentration / 4.4 µm} gave least effect • description of pattern of numbers of flowers with GA concentration • comment on error bars and validity 1 2 3

FROM THESE SECTIONS BELOW MAX 2 credit FROM EACH

4+ 5

- **comment on gibberellins mode of action**
  gibberellins may promote or inhibit flowering
  GA affects metabolic and regulatory pathways
  GA action on aleurone layer and secretion of amylase (accept in relation to seed as well)
  GA acting as a transcription factor
  GA affect gene expression / cell division linked to flowering

6 + 7

- **comment on phytochromes**
  {photoreceptors / phytochromes} absorb (red and far red) light
  {Pfr low / Pr high} gives flowering in short day plants
  {Pfr high / Pr low} gives flowering in long day plants
  active form Pfr can activate / repress specific gene expression linked to flowering

  Pfr---------far red light (730nm)---→ Pr (inactive)

  Pr----------red light (660nm)--------→ Pfr (active form)

  Full sunlight contains more red than far red light so at sundown all phytochrome is Pfr
  {in light / during the day} Pr is converted into Pfr
  In the dark Pfr spontaneously converts back to Pr
  reference to photoperiodism – importance of relative duration of {light / dark} periods

(6)

		Additional guidance
Level 0	0	No awardable content
Level 1	1-2	Level 1: Description of (a minimum of 2 specific) results from diagram and graph
Level 2	3-4	Level 2: Reference to all of level one plus limited discussion of the effects of light on flowering and /or gibberellin
Level 3	5-6	Level 3: Reference to all of level one and two one detailed discussion of the effects of light on flowering and gibberellin

Question number	Answer	Additional guidance	Mark
7(a)(i)	Choose an item. • B is the correct answer A is not the correct answer as two statements are correct C is not the correct answer as energy in muscle contraction is not used to release ADP and Pi from ATP D is not the correct answer as two statements are correct		(1)

Question number	Answer	Additional guidance	Mark
7(a)(ii)	A description that includes four of the following points: • calcium ion channels open in the sarcoplasmic reticulum / calcium ions released {from sarcoplasmic reticulum / into sarcoplasm} (1) • allowing myosin to bind to actin / (actin-myosin) cross bridge formed (1) • ADP and Pi are released resulting in a power stroke / ADP and Pi are released resulting in actin pulled {over myosin / towards the M line/ towards the centre} (1) • ATP binds (to myosin head) and {crossbridge is broken / myosin head detaches} (1) • ATP is hydrolysed (1) • (providing energy) to change the myosin (head) {shape / position} (1)	**mps need to be in logical order to gain credit** accept calcium ions bind to troponin / calcium ions cause (myosin) binding sites to be exposed accept ATP broken down into ADP and Pi accept myosin (head) returns to its original position do not accept the power stroke	(4)

Question number	Answer	Additional guidance	Mark
7(b)(i)	An answer that includes two of the following points: • {muscle T is the largest muscle / muscle F is the smallest muscle} (in both species) (1) • (mean) muscle mass is larg**er** in the Zimbabwean blue / the Zimbabwean blue muscles are larg**er** (1) • correct conclusion regarding SD and mean mass of muscles (1)	accept order of muscles in size T>G>F accept converse accept for all muscles or a stated muscle e.g. • no significant difference (between the two ostriches) for muscle T as SD overlap • significant difference (between the two ostriches) for muscle {F / G} as SD do not overlap • no significant difference between muscle G and F as SD overlap	(2)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	An answer that includes two of the following points: low validity (of conclusions) because: • muscle T in both types of ostrich as the SD overlap (1) • {very few / small sample size of} Zimbabwean blue (1) • stated variables may not have been controlled (1) • it was only one study (1) conclusions valid because: • muscle {F / G} for SAB and Zimbabwean blue has {significant difference / no SD overlap} (1)	ignore no repeats accept the numbers of Zimbabwean Blue and South African Black are not the same allow results may be anomalous e.g. nutrition / physical activity / age / gender accept small {SD/error bars} indicating {repeatability / validity / less variability in data}	(2)

Question number	Answer	Additional guidance	Mark
7(b)(iii)	A calculation showing the following steps: • calculation of difference between muscle mean mass (1) • calculation of percentage difference and answer to two decimal places (1)	0.59 – 0.74 or -0.15 or (0.74 – 0.59) = 0.15 (-0.15 ÷ 0.665) x 100 =(-)22.56 Correct answer scores full marks ecf for second marking point if uses added or subtracted SDs ecf if use wrong muscle but calculation correct and to two decimal places = 1 mark eg. for muscle T = 24.20 Muscle F = 22.22	(2)

These are the most common responses but please always use the mark scheme

1 mark	2 marks
0.59 – 0.74 (=0.15)	(-)22.56
0.74 – 0.59 (=-0.15)	
(-) 0.15	
(-) 22.6	
(-)13.89	
(-)5.80	
(-)40.63	
(-)32.79	
(-)24.20 (muscle T)	
(-)22.22 (muscle F)	

Question number	Answer	Additional guidance	Mark
7(c)	An explanation that includes three of the following points: • thermoreceptors detect changes in temperature (1) • (impulses sent to) thermoregulatory control centre / heat {gain / loss} centre (1) • hypothalamus sends impulses {via motor neurones / via sympathetic neurones / to appropriate named effector} (1) • correct response (by effectors) to {increase heat energy gain / reduce heat energy loss} (1)	reject signal accept hypothalamus has thermoreceptors / temperature sensor / temperature receptor accept hypothalamus receives impulses from {thermoreceptors / temperature sensors / temperature receptor} ignore thermoregulators ignore control centre unqualified e.g. skeletal muscles, sweat glands, hair erector muscles, liver, smooth muscles in skin blood vessels e.g. vasodilation, metabolism of brown fat, (increased / decreased) sweat production	(3)

Question number	Answer	Additional guidance	Mark
8(a)	An answer that includes the following points: • (organ is a) group of tissues {working together / perform similar functions} (1) • which (forms a discrete unit that) can {detect / sense} a {stimulus / change in the environment} (1)	ignore cells accept respond to a {stimulus / change in environment} accept contains nerve endings accept detect sensations ignore meanings of 'sense' organ ignore contains receptors	(2)

Question number	Answer	Additional guidance	Mark
8(b)	Choose an item. Connective tissue / Contains collagen / Rich in nerves / Envelops muscle fascia: ✓ / ✓ / ✓ ligaments: ✓ / X / X	All correct 2 marks 3 to 5 correct = 1 mark 0 to 2 correct = 0 marks accept yes for ✓ accept no for x ignore blank boxes	(2)

Question number	Answer	Additional guidance	Mark
8(c)	An answer that includes three of the following points: • stimulus detected by {specialised pain receptors / nociceptors} in fascia (1) • causes release of neurotransmitters / chemical response (1) • which causes {nerve impulse / action potential / depolarisation} (in sensory neurones) (1) • (impulse) transmitted to pain centre (in brain / CNS) (1)	accept fascia rich in {nerves / nerve endings} accept fascia is a sensory organ accept increase in percentage of {nociceptive fibres / pain receptors (that respond to harmful stimuli)} accept causes inflammation accept opening of sodium ion channels / sodium ions enter (sensory) neurone accept {brain / CNS} interprets the impulse as pain	(3)

Question number	Answer	Additional guidance	Mark
8(d)	A description that includes three of the following points: • {tissue injury / cell damage / bacterial or viral infection / / foreign antigen / exercise} (1) • release of {histamine / cytokines / hormone / chemical} (1) • (therefore) vasodilation (of fascia blood vessels) occurs (1) • {swelling / oedema} occurs due to {increase / entry} of {macrophages / white blood cells / fluid} (in the fascia) (1)	accept injury / harm / damage (to fascia) unqualified ignore fibromyalgia ignore adrenaline accept increased permeability of capillaries accept description of vasodilation / increased blood flow accept entry of {white blood cells / macrophages} (from blood)	(3)

Question number	Answer	Additional guidance	Mark
8(e)	A description that includes four of the following points: • fibroblasts respond to {mechanical / chemical stimuli / TGF-beta / transcription factor} (1) • causing {a change in gene expression / switching genes on / differential gene expression} (1) • due to {epigenetic modification / histone modification / DNA methylation} (1) • {active / switched on} genes are transcribed (into mRNA) (1) • translation (of mRNA) occurs (at the ribosome) (1) • (resulting in) formation of proteins needed for {differentiation / specialisation} {of **fibroblasts** / to **myofibroblasts**} (1)	accept fibroblasts 'drink' TGF-beta accept TGF-beta enter cell accept genes are activated accept formation of proteins needed for myofibroblast formation e.g collagen accumulation	(4)

Question number	Answer	Additional guidance	Mark
8(f)	An answer that includes the following points: • lymph flows due to {external mechanical compressions / contraction of (skeletal) muscles / peristalsis / contraction} of (lymph) vessel (1) • (one direction due to) valves in the lymphatic system (1) • {stimulation / coordination} by {parasympathetic / sympathetic} nervous system (1)	Accept muscle contractions unqualified accept cytoplasmic extent of endothelial cells	(3)

Question number	Answer	Additional guidance	Mark
8(g)	An answer that includes three of the following points: • lymphatic vessel walls become {thinner / weaker} (1) • due to {less / thinner / weaker} muscle (in lymphatic vessels) (1) • {less / thinner / weaker} elastic tissue (in lymphatic vessels) (1) • deterioration of {nerve network / nerves} (in endothelial layer) (1) • decrease in number of {(lymph or blood) vessels / lymphangions} (1)	ignore blood accept lymph for lymphatic vessel accept aneurysms develop (in the l**ymph)** ignore reduced {contraction of muscle / peristalsis} accept less elasticity	(3)

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